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ABSTRACT

With the emergence in physics of relativity and quantum theories in the first decade of this century a paradigm shift took place from a predominantly mechanistic to a dynamic world view. This shift formed the basis of the New Science Movement, including the new physics, in the 1970s. The movement is international, interdisciplinary, dynamic, and open in its research to the natural and social sciences, arts, and religion. This paper investigates the spiritual and educational dimensions of the New Science Movement. It looks at concepts central to the movement, such as space and time, wave/particle duality, the local and the nonlocal, the parts and the whole, order and disorder (chaos), and knowledge as a network of relations. It tries to show a link to education and spirituality. On the basis of the works from representatives of the New Science Movement, such as David Bohm, Fritjof Capra, David Peat, Danah Zohar, and Ken Wilber, the paper suggests that interpretations of spiritual and educational dimensions of the New Science Movement might be considered for educational processes in general. Contains 26 references. (Author/JRH)

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The Spiritual and Educational Dimensons of The New Science Movement

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The Spiritual And Educational Dimensions of The New Science Movement.

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Paper to be presented at the American Educational Research Association, Annual Meeting

New York, 8-14 April, 1996.

With the emergence in physics of relativity and quantum theories in the first decade of this century, a paradigm shift took place from a predominantly mechanistic to a dynamic world view. This shift formed the basis of the New Science Movement, including the new physics, in the 1970s. The movement is international, interdisciplinary, dynamic and open in its research to the natural and social sciences, arts and religion. The spiritual and educational dimensions of the New Science Movement have not been fully considered.

This paper investigates the spiritual and educational dimensions of the New Science Movement. It looks at concepts central to the movement, such as space and time, wave/particle duality, the local and the nonlocal (nonlocality), the parts and the whole, order and disorder (chaos), and knowledge as a network of relations. It tries to show a link to education and spirituality. On the basis of the works from representatives of the New Science Movement, such as David Bohm, Fritjof Capra, David Peat, Danah Zohar and Ken Wilber, the paper suggests that interpretations of spiritual and educational dimensions of the New Science Movement might be considered for educational processes in general.

Already in 1985, Ken Wilber, as editor of the book The Holographic Paradigm and other Paradoxes: Exploring the Leading Edge of Science, suggested that "agree or disagree with the new paradigm(s), one conclusion unmistakably emerges: at most the new science demands spirit;

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at least, it makes room for ample spirit (p.4).

Wilber's predictions seemed to be right, as he himself demonstrates in his epochal book Sex, Ecology and Spirituality: The Spirit of Evolution (1995) and also in A Brief History of Everything (1996). Today, it is not so much that spirit in itself is denied, but more important, it is that scientific matters be seen together with spiritual matters, as this paper tries to show.

Y. S. Lincoln and N. K. Denzin (1994) introduced the term "sacred science" in their article "The Fifth Moment" in the Handbook of Qualitative Research, referring to Peter Reason's (1993) article "Reflections on Sacred Experience and Sacred Science." Lincoln and Denzin say, "and so we will likely see a reemergence of deliberation about how science [education] and the sacred [spirituality] fit together" (p. 583). The authors claim that the process is already in motion in the academic and nonacademic worlds.

Let us start with clarifying the term "The New Science Movement."

Einstein (1993), in 1948, in a speech to intellectuals, talked about revolutionizing our thinking, our actions and having the courage to revolutionize our relations to other nations. He asked for a different mindset. Einstein could say these provocative words to intellectuals, because he was one of the greatest physicists of our times, had discovered relativity theory and taken part in the development of quantum theory. These theories are the main constituents for understanding the New Science Movement.

These theories, also called the new physics, have their origin at the beginning of this century. Before that science was predominantly dominated by Newtonian physics, a physics which started after Newton discovered new laws of forces and motion. Gravity was included as a fundamental force. With Newton we generally set the beginning of a mechanistic world view,

based on quantitative measurement. This view was interpreted basically by a rigorous determinism controlled by cause and effect and held to the underlying Cartesian separation of mind and body. Space and time, fundamental building blocks of our world, were seen as separate entities. This science relied on the systematic procedures of experiment and verification.

With the formulations of Einstein's Special Relativity theory in 1905, the classical Newtonian concepts of space and time were abandoned. Space and time came to be seen as a continuum, intimately connected with each other (Capra, 1982, p. 89). Having the stroke of a genius to unify space and time, Einstein set in motion attempts by others to unify other basic concepts in life. The concepts of the sacred and science, sacred science, is one of the recent examples to unify "extreme" concepts, as mentioned above by Denzin, Lincoln and Reason. The physicist Jones (1982, 1992) in his books Physics as Metaphor and Physics for the Rest of Us: Ten Basic Ideas of Twentieth Century Physics that Everybody Should Know, and How They Shaped Our Culture and Consciousness argues, by combing space and time, Einstein filled these metaphors with substance and meaning again, as it was known in ancient times.

Further, quantum theory was developed in the first three decades of this century by famous physicists from Europe, in addition to Einstein, beginning with Max Planck from Germany, and followed by Niels Bohr from Denmark, Louis de Broglie from France, Erwin Schroedinger and Wolfgang Pauli from Austria, Werner Heisenberg - like Planck - from Germany, and Paul Dirac from England.

Quantum theory deals with the subatomic world, with the inconceivably small units of that world. Quanta are energy packets. In quantum theory, electrons, when measured, can show up as particles and as waves, the so called wave/particle duality. Heisenberg's uncertainty

principle addresses this phenomenon. In the measurement of the simultaneous position and motion of an electron, there is always an irreducible degree of uncertainty or indeterminacy. Since the observed phenomenon depends on how we observe it, every measurement is only an approximation of reality. Quantum theory tells us that there is no objective world. Since the observed phenomenon depends on the observer, our objective world depends on our subjective observation. There is no accurate description. One has to understand the wave-like and particle-like aspect of being in respect to the nature of things. It is the duality itself which is basic. "Quantum stuff" is essentially wave-like and particle-like, simultaneously (Zohar, 1990, p. 25).

Quantum theory tells us further that quite distant electrons/objects seem to be connected directly without touching each other. Physicists talk about this phenomenon as nonlocality (Bohm and Hiley, 1993; Peat, 1990; Zohar, 1990; Capra, 1982; Bohm, 1980).

Relativity and quantum theory changed the view of the world drastically. They shook the foundations of what was called reasonable. The New Science Movement, in the last three decades, has had a visible forum for dealing with the discoveries of relativity and quantum theory and its implications. An abundant amount of literature has been published with respect to the New Science Movement and the interest in it grows rapidly. Since the New Science Movement regards itself as being open, dynamic, in flux, not knowing in which direction it will go, it has not been labelled in terms of a fixed set of boundaries, and has not been characterized in *isms*. One cannot even be certain who belongs to the movement. Although there exists great enthusiasm about the new physics, as part of the New Science Movement, Wilber (1985) holds out a warning about its results and implications.

David Bohm, the renowned physicist, as one representative of the movement, offers a

theory of an implicate or hidden order, derived from experiments in quantum theory, where our brain constructs concrete reality out of a realm of meaningful, patterned primary reality that transcends space and time. It is a world beyond disorder (chaos) or the explicate order (Wilber, 1985, p.5). It is an order where the whole is more than the sum of its part. It is, as a result of Bohm's investigations in quantum theory, also called by him the quantum potential. It is an order where wholes can be parts and parts can be wholes. Wilber coins the notion holons for the part/whole-whole/part situation (see Wilber, 1995, 1996). This alternative view to interpret concepts concerning order changes our consciousness, changes our view of reality (see Walz-Michaels, 1995).

Fritjof Capra (1982, 1983) proposes a paradigm shift from the classical to an emerging systems view of life, mind and evolution. It stresses the interconnectedness and interdependence of all the concepts he represents, including the concepts I represent in this paper. The concept of knowledge is then seen as a network of relations. All scholars of the New Science Movement, as loosely as the movement was defined above, agree on that fact.

Bohm and Peat (1987) propose, as a consequence of a series of dialogues, a creative approach along new lines to the question of what is meant by science. Peat (1987) holds the view that there is an order underlying our reality as does Bohm. He calls this order "synchronicities". Peat (1990, 1991) explores the concept of nonlocality in quantum theory and the philosophical problems it poses. For him, nonlocality is the central concept, and it has to be integrated in the wholeness and complexity of our physical and mental world.

Friedman (1990) formulates the local/nonlocal concept as follows, pointing to the discovery of Bell's theorem in 1964. It is

the condition that defines the causal relationship between events. In a local reality, information cannot travel faster than light. In a nonlocal reality, objects can influence each other instantaneously. Bell's theorem indicates that if the world is made of sepearate objects, they must have nonlocal connections. Bohm's concept of quantum potential supports such connections. (p. 317)

Chaos theory, as the third revolutionary change in physics in this century, can be regarded as another extension of relativity and quantum theory and another way of understanding order. Bohm (1983) focuses first on the concept of order, while chaos theory puts emphasis on the concept of chaos first. Peat (1991) gives insight into both and shows the connection between them.

Zohar (1990) guides us through the strange fascinating workings of the subatomic world to create a model of consciousness, shifting the concept of order also in a new direction. She points out that traditionally physicists haave made the either/or distinction in thinking about concepts. But quantum reality has called the either/or thinking into question. When dealing with quantum reality, we have to learn a new both/and kind of thinking. We have to learn to get beyond apparent contradictions and the problems of dualities (p. 20). Our concept of relations in respect to the individual and society has to change.

Having talked now in brief about central concepts of the New Science Movement, the title of this paper suggests implications in respect to educational and spiritual dimensions. In other words: spiritual and educational dimensions are linked in some ways to that movement. But what does that mean for us who are educators?

In Reason's (1993) article "Reflections on Sacred Experience and Sacred Science," he

talks about "Reaching For a Vision of Sacred Inquiry", by pointing out that "human endeavors must be both grounded in immediate experience of the presence of the world and contained with a wider cosmology" (p. 276). This groundedness in both, the immediate experience and the wider cosmology goes beyond traditional logic and touches the heart of what is investigated here. It is a dialectical ontology which embraces the paradox of opposites and emphasizes the significance of what goes on in between as much as the action around the poles (see also Reason, 1993). It is at this moment that we can deepen our understanding about quantum stuff. Zohar (1990) formulates it, stressing that in quantum physics, the nature of matter or perhaps being itself

> follows from the description of the wave/particle duality--the description that all being at the subatomic level can be described equally well either as solid particles . . . or as waves, like undulations on the surface of the sea. Quantum'stuff' is essentially *both* wavelike and particlelike, simultaneously. (p.25)

Neville (1989), in Educating Psyche: Emotion, Imagination and the Unconscious in Learning, talks about "psycho stuff" when describing the problems of direct and indirect learning and teaching methods as part of educating psyche. It seems that psycho stuff is quantum stuff, as well. It seems to be a case of both/and (see Walz-Michaels, pp. 293-294).

Herbert (1985), in Quantum Reality: The World Beyond the New Physics, points to the importance of an understanding about quantum stuff by saying "The world is all substance. . . . If quantum stuff is all there is and you don't understand quantum stuff, your ignorance is complete" (p.40).

My dissertation, The New Science Movement and its Implications for Educational

Thought and Practice (1995), concludes with the chapter "Conclusion or Both/And Education" (p. 318). It begins with a paragraph out of Neinhardt's (1932/1988) book Black Elk Speaks about the life story of a Holy Man of the Oglala Sioux. It is an attempt to find the right vocabulary to make a bridge between Black Elk's wisdom, his spirituality and the results of my study. Here I want to mention that Heisenberg in his studies pointed out the insufficiency of ordinary language for such discourse (see Walz-Michaels, p.p. 127-128).

Investigations in central concepts of the New Science Movement, such as as space and time, wave/particle duality, certainty and uncertainty, objects and subjects and paradoxes, local and nonlocal, the parts and the whole, order and disorder (chaos) as well as, parallel to it, investigations in four major concepts in education such as: thought and practice, quantitative and qualitative research, the general and the special, the self and the others and/or the one and the many, helped me to comprehend what is meant by understanding the relationship - similarities and differences - both/and - between quantum stuff and psycho stuff and between these pairs of concepts, although they are drawn from quite opposite academic fields, as we would traditionally see them. To go beyond these boundaries, by expanding language, helped me not only to understand scientific processes but also educational processes in a new light. My investigations lead to the assumption that these are pairs of concepts which can be seen as one, if you allow yourself the freedom to change consciousness. In other words, by introducing the way of knowing of this native American holy man, representative of the Oglala Sioux, as one well-known example of a spiritual life, and my efforts to understand reality through examples (concepts) of the New Science Movement *and* education, a link was made and a gap was closed between the here discussed three dimensions, the scientific, the educational and the spiritual.

This closure seems generally to be vehemently denied in our modern way of life.

Peat (1991) points to the connection between (the new) science and the sacred through the description of the Native American people and their ability to draw maps. Map drawing has also become a very helpful tool for educational processes (see Paulston & Liebman, 1994), and it has always been central for scientific investigations. The most important point in respect to the Sioux and us, as educators, is to hear that "in the native map, there is no sharp distinction between space and time or between the sacred and the every day.... Everything in the map is, at one and the same time, both sacred and practical" (p.21).

Slattery (1995), in "A Postmodern Vision of Time and Learning: A Response to the National Education Commission Report 'Prisoners of Time,'" says,

> Research efforts designed to manipulate time as an isolated, independent, and quantifiable variable can be traced to the assumption that the universe was created in time and space, as opposed to time and space being interwoven into the very essence of the cosmos. (p.613)

We here think of Jones (1982, 1992), mentioned above, as well, who reminded us that Einstein filled the metaphors of space and time with meaning again and by doing this set the start for others to look to unifying other basic concepts.

If the concepts of the sacred and the practical (sacred science), the spiritual and the scientific, are seen together, how do we express the dimensions of this whole outlook in respect to education? We might, not only in physics and other sciences, but also in the field of education consider a both/and besides an either/or thinking. We might consider -- in our belief system -- a new map of reality combining concepts which are seen as extremes and which are always seen at

the far ends of the spectrum. We are asked to have a different mindset, as Einstein formulated it in "A message to Intellectuals" in 1948.

Bohm and Peat (1987) in Science, Order and Creativity expressed these thoughts in reference to the concept of "belief". "What is needed is clearly a middle ground between the extremes of credulous belief, aimed at making people feel happier and more secure irrespective of whether the beliefs happen to be correct, and a total skepticism which results in a cynical attitude to everything" (p. 264).

This does definitely not mean that all concepts are thrown together forming an undistinguishable grey zone of dimensions - Slattery (1995) here points to the zone of the middle dimensions where we fail to recognize complexity and the interrelatedness of actions (p. 625). But it means for us to develop the capability to see concepts existing for themselves as well as emerging with each other. both/and....

By freeing ourselves from the intolerable extremes in thinking and acting which set borders everywhere, physically and mentally, we open a new range of possibilities for education. Choices and potentials are opened for each of us. It is a question of a different view of order which is asked for in this investigation, and it is our responsibility and commitment as educators to look into this possibility.

Concepts in relativity and quantum theory, seen as new metaphors of life and learning, touch the question of a different degree of order. By making a switch of the mind to open ourselves to that kind of order, we can start anew. Our system of thought needs this training, which basically can be called a training in switching consciousness. We have to learn to incorporate the local and the nonlocal. Our system of thought has been fragmented for too long.

It is at this point that I refer to education as a process and movement towards learning and healing, in dialogical form, between all possible relations (see Walz-Michaels, 1995). Let me conclude with a quote from Bohm and Peat(1987):

> What is clearly needed is a dialogue between these attitudes [extremes], in which sooner or later they can all come into the "middle ground" between them, which will make available a new order of operation of the mind with rich possibilities for creativity. The opening of such a dialogue could play a crucial role, in freeing the consciousness of humanity from one of the most significant blocks in creativity in its tacit infrastructure. (p. 265)

The process of education might become quite simple--in all its complexity--if we give up rigid oppositional patterns of mind, whatever the patterns are. Education would then be an exciting endeavor again, carried out with all our potentials. It might be that the three dimensions, the spiritual the scientific and the educational, represented through the self and the others, the one and the many, come naturally together again, as a continuous unfolding and enfolding, as a fusion of mind and matter. They form a bond between sacred and everyday life. As I understand it, these are the educational and spiritual dimensions of the New Science Movement in their deepest analysis.

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